

Notice of Allowability

Application No.

10/814,284

Examiner

Abbas I. Abdulsalam

Applicant(s)

HASHIMOTO ET AL.

Art Unit

2629

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to 04/01/04.
2. ☒ The allowed claim(s) is/are 1-20.
3. ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some* c) ☐ None of the:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
- (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
- 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
- (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☒ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3. ☒ Information Disclosure Statements (PTO/SB/08),
Paper No./Mail Date 04/01/07
4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material

5. ☐ Notice of Informal Patent Application

6. ☐ Interview Summary (PTO-413),
Paper No./Mail Date _____.

7. ☐ Examiner's Amendment/Comment

8. ☐ Examiner's Statement of Reasons for Allowance

9. ☐ Other _____.


RICHARD HJERPE
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2600

DETAILED ACTION

Allowable Subject Matter

1. Claims 1-20 are allowed.

Reasons for allowance

2. The following is an examiner's statement of reasons for allowance:

Segler et al. (USPN 6905215) teach apparatus and method for reducing the moire effect in rear-projection displays by rotating the dark-stripe structure (711, 712) in the screen (71) $45^{\circ} \pm 15^{\circ}$ degrees relative to the displayed pixel structure. By rotating the dark-stripes (711) relative to the displayed pixels, the spatial frequency at which the moire effect sets in can be improved by 15% to 41% (See Fig. 4(a-b)).

Regarding claim 1, prior art does not teach an image display apparatus for displaying an input image whose pixel arrangement is an orthogonal arrangement by converting the image into an image in a non-orthogonal arrangement, the apparatus comprising: a display device having a non-orthogonal arrangement type screen on which an electrode matrix for controlling a display is arranged; a band limitation filter for performing an operation for narrowing a space frequency range of image data that represent the input image; an arrangement conversion circuit for performing an operation for converting a pixel arrangement of an output of the band limitation filter from the orthogonal arrangement into a cell arrangement of the screen; and a driving circuit for applying a drive voltage to the electrode matrix in accordance with an output of the arrangement conversion circuit.

Regarding claim 3, prior art does not teach an image display apparatus for displaying an input image whose pixel arrangement is an orthogonal arrangement by converting the image into an image in a non-orthogonal arrangement, the apparatus comprising: a display device having a non-orthogonal arrangement type screen on which an electrode matrix for controlling a display is arranged; an image conversion circuit for performing an add operation with weighting that is for narrowing a space frequency range of image data that represent the input image and is for converting the pixel arrangement from the orthogonal arrangement into a cell arrangement of the screen; and a driving circuit for applying a drive voltage to the electrode matrix in accordance with an output of the image conversion circuit.

Regarding claim 7, prior art does not teach an image filter that is used for a display by a delta arrangement type screen including a plurality of pixels, wherein the filter converts an input image into an image suppressing a space frequency component that exceeds a Nyquist limit determined by three elements including a pixel pitch of the screen in the vertical direction, a pixel pitch of the screen in the horizontal direction and weights that are preset in the vertical direction and in the horizontal direction.

Regarding claim 8, prior art does not teach an image filter that is used for a display by a delta arrangement type screen including a plurality of pixels, comprising: a multiplying portion for multiplying a data value of an input image by a coefficient; and an adding portion for adding N products obtained by the multiplying portion, wherein the image filter performs a

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neighborhood operation for calculating display luminance values of the pixels on the screen from luminance values of N data points in the input image, and delivers an image whose space frequency is suppressed outside a Nyquist limit that is determined by a pixel pitch of the screen in the vertical direction, a pixel pitch of the screen in the horizontal direction and weights that are preset in the vertical direction and in the horizontal direction.

Regarding claim 9, prior art does not teach an image conversion method that is used for a display by a delta arrangement type screen including a plurality of pixels, the method comprising: performing a neighborhood operation for calculating display luminance values of the pixels on the screen from luminance values at N data points in the input image as an operation for converting an input image into an image whose space frequency is limited; making a data point pitch in the vertical direction of the input image be a half of a pixel pitch $y_{sub.0}$ in the vertical direction of the screen and a data point pitch in the horizontal direction of the input image be a half of a pixel pitch $x_{sub.0}$ in the horizontal direction of the screen; and multiplying a luminance value at the data point of the input image by a coefficient $\rho_{sub.j}$ in the neighborhood operation, the coefficient $\rho_{sub.j}$ being defined by the following expression 53
$$\rho_{sub.j} = \frac{1}{N} \left\{ \sum_{j=1}^N \left(\frac{1}{\omega_{sub.j}} \right) \right\}^{-1/2}$$
 where $\omega_{sub.j}$ is an integral value within an area σ of a preset Nyquist limit, which is defined by the following expression 54
$$\omega_{sub.j} = \exp(-2j_x) \exp(-2j_y) \exp(-2j_v)$$
 where $\xi_{sub.j}$ and $\psi_{sub.j}$ are components of coordinates $(\xi_{sub.j}, \psi_{sub.p})$ of a position of the coefficient $\rho_{sub.j}$ with respect to a pixel whose intensity is to be calculated, while μ and ν are components of coordinates (μ, ν) in a frequency space.

Regarding claim 15, prior art does not teach an image conversion method that is used for a display by a delta arrangement type screen including a plurality of pixels, the method comprising: performing a neighborhood operation for calculating display luminance values of the pixels on the screen from luminance values at N data points in the input image as an operation for converting an input image into an image whose space frequency is limited; making a data point pitch in the vertical direction of the input image be not a half of a pixel pitch $y_{sub.0}$ in the vertical direction of the screen or a data point pitch in the horizontal direction of the input image be not a half of a pixel pitch $x_{sub.0}$ in the horizontal direction of the screen; and multiplying a luminance value at the data point of the input image by a coefficient $\rho_{sub.j}$ in the neighborhood operation, the coefficient $\rho_{sub.j}$ being defined by the following expression

$$\rho_{sub.j} = \int_{-1/2}^{1/2} \int_{-1/2}^{1/2} \{ \exp(-2j\xi) \exp(-2\nu\psi) \} \chi_{sub.jk}^{-1} d\xi d\psi \quad (55)$$

where $\omega_{sub.j}$ is an integral value within an area a of a preset Nyquist limit, which is defined by the following expression

$$\chi_{sub.jk} = \int_{-1/2}^{1/2} \int_{-1/2}^{1/2} \exp(-2j\xi) \exp(-2\nu\psi) \exp(2(j-k)\xi) \exp(2\nu(j-k)\psi) d\xi d\psi \quad (56)$$

where $\xi_{sub.j}$ and $\psi_{sub.j}$ are components of coordinates $(\xi_{sub.j}, \psi_{sub.j})$ of a position of the coefficient $\rho_{sub.j}$ with respect to a pixel whose intensity is to be calculated, while μ and ν are components of coordinates (μ, ν) in a frequency space, while $\chi_{sup.-1.sub.jk}$ is an inverse matrix of a matrix $\chi_{sub.jk}$ that is defined by an integral value within an integral area determined by $\omega_{sub.j}$ and a pixel pitch and

$$\chi_{sub.jk} = \int_{-1/2}^{1/2} \int_{-1/2}^{1/2} \exp(-2j\xi) \exp(-2\nu\psi) \exp(2(j-k)\xi) \exp(2\nu(j-k)\psi) d\xi d\psi \quad (57)$$

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Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

3. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Abbas I. Abdulsalam whose telephone number is 571-272-7685. The examiner can normally be reached on Monday through Friday from 9:00 A.M. to 5:30 P.M.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Richard Hjerpe, can be reached on 571-272-7691. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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Examiner
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March 08, 2007



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